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ABSTRACT

The objectives of this study are twofold: a) measuring students' expressive engagement levels while increasing the teachers' use of two teaching strategies, Personalizing the Task (PT) and Recognizing Individual Achievement (RIA); and b) testing the use of observation, feedback, and training as a practical model for changing teacher behavior. Expressive engagement was defined here as active student involvement in learning task. Trained observers recorded the use of PT and RIA by three third and fourth grade teachers and the levels of engagement for 30 low-income students who were diagnosed as potential academic and discipline problems. During the 5-day experimental period for each strategy, observers and teachers met to discuss strategy frequency and suggest ways of using selected strategies. Observer feedback was effective in modifying teacher behavior. The frequency of both strategies increased while student engagement levels showed no consistent relationship to strategy use. Strong individual differences in the implementation of these strategies was proposed as a possible explanation. (Graphs and charts of statistical data are presented in the text. The appendixes include definitions and explanations of teacher strategies, student behavior, and interobserver agreement tables.) (Author/BRB)

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Technical Report No. 34

THE IMPACT OF CHANGES IN SELECTED TEACHER STRATEGIES ON EXPRESSIVE STUDENT ENGAGEMENT

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Stanford, California

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This report reproduces a dissertation of the same title submitted to the School of Education, Stanford University, 1973.

INTRODUCTORY STATEMENT

The Center's mission is to improve teaching in American schools. Too many teachers still employ a didactic style aimed at filling passive students with facts. The teacher's environment often prevents him from changing his style, and may indeed drive him out of the profession. And the children of the poor typically suffer from the worst teaching.

The Center uses the resources of the behavioral sciences in pursuing its objectives. Drawing primarily upon psychology and sociology, but also upon other behavioral science disciplines, the Center has formulated programs of research, development, demonstration, and dissemination in three areas. Program 1, Teaching Effectiveness, is now developing a Model Teacher Training System that can be used to train both beginning and experienced teachers in effective teaching skills. Program 2, The Environment for Teaching, is developing models of school organization and ways of evaluating teachers that will encourage teachers to become more professional and more committed. Program 3, Teaching Students from Low-Income Areas, is developing materials and procedures for motivating both students and teachers in low-income schools.

The study summarized here represents part of the work of Program 3 on the effect of various teaching strategies on student engagement.

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ABSTRACT

The objectives of this study were to measure students' expressive engagement levels while increasing their teachers' use of 2 teaching strategies, and to test whether observation, feedback, and training, used together, are a practical model for promoting changes in teacher behavior. Expressive engagement was defined as active student attention to or involvement in a learning task. The strategies were Personalizing the Task and Recognizing Individual Achievement. The design followed an N = 1 format.

Trained observers recorded the use of the 2 strategies by 3 third- and fourth-grade teachers and the associated levels of engagement for a sample of 30 students, 10 in each of 3 classrooms, in low-income area schools. The teachers picked pupils they had diagnosed as potential academic or discipline problems. Baseline data were gathered for eight days (16 hours) of observation time in each classroom. During the five-day (10 hour) experimental period for each strategy, observers met daily with each teacher to report on strategy frequency and engagement of students and to suggest ways to increase the teacher's use of the selected strategy.

Observer feedback was effective in modifying teacher behavior. The frequency of the Personalizing the Task strategy showed an overall average increase of 51.8 occurrences per two-hour observation period; the frequency of Recognizing Individual Achievement showed an overall average increase of 10.3 occurrences per observation period. However, the data on student engagement showed no consistent relationship to the increases in strategy use.

There was evidence of strong individual differences in the way strategies were implemented, which may account for a lack of consistency in engagement level changes.

The study demonstrated to the teachers that they could modify their instructional techniques by objectively monitoring student responses in their classrooms. The method gave them an objective view of their influence on their classes. All the teachers reported that they enjoyed the project. They seemed to be motivated and stimulated by ideas from the observer/teacher interaction.

TITLE OF DOCUMENT THE IMPACT OF CHANGES IN SELECTED TEACHER STRATEGIES ON EXPRESSIVE STUDENT ENGAGEMENT

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TABLE OF CONTENTS

		Page
LIST OF TABLES		vi
LIST OF ILLUSTRATIONS		vii
CHAPTER		
I.	THE PROBLEM	1
II.	DESIGN OF THE STUDY	10
III.	RESULTS AND DISCUSSION	23
BIBLIOGRAPHY		36
APPENDIX		
A.	TEACHER STRATEGY INSTRUMENTS AND DEFINITIONS	39
B.	STUDENT ENGAGEMENT INSTRUMENTS AND DEFINITIONS	46
C.	INTER-OBSERVER AGREEMENT DATA	52

LIST OF TABLES

TABLE		Page
1	Mean Engagement Levels and Fluctuations for Sample #3 in Language Arts and Math	29
I	Inter-Observer Reliability of Teacher Strategies and Student Behavior Categories, Mean Adjusted Agreement over Ten Minute Calibration Period Across All Rounds for All Observers	53
II	Inter-Observer Reliability of Teacher Strategies, Mean Adjusted Agreement over Ten Minute Calibration Period for All Observers, Round I	54
III	Inter-Observer Reliability of Student Behavior Categories, Mean Adjusted Agreement over Ten Minute Calibration Period for All Observers, Round I	55
IV	Inter-Observer Reliability of Teacher Strategies, Mean Adjusted Agreement over Ten Minute Calibration Period for All Observers, Round II	56
V	Inter-Observer Reliability of Student Behavior Categories, Mean Adjusted Agreement over Ten Minute Calibration Period for All Observers, Round II	57
VI	Inter-Observer Reliability of Global Student Behavior Categories, Mean Adjusted Agreement for All Observers over Ten Minute Calibration Period	58

LIST OF ILLUSTRATIONS

Figure		Page
1	Teaching Strategies and Student Engagement, Teacher 1	18
2	Teaching Strategies and Student Engagement, Teacher 2	19
3	Teaching Strategies and Student Engagement, Teacher 3	20
4	Percentage of 2 Ratings on Expressive Global Engagement, Language Arts	21
5	Percentage of 2 Ratings on Expressive Global Engagement, Math	22
6	Engagement Pattern of the Least Fluctuating Student	31
7	Engagement Pattern of the Most Fluctuating Student	32

CHAPTER I

THE PROBLEM

Introduction

Studies in education have been directed toward changing teacher behavior. Extensive work has not been done in a systematic way to examine what effects teacher changes have on pupil behavior. Thus, there is a real need to study teacher behavior and student responses in the same context. In order to introduce effective changes in expressive classroom engagement (active student attention and involvement), teachers need to know that changes in their behavior can have positive effects on student learning and motivation. They also need to know the probable consequences of specific changes so that they can select those most appropriate to their situation. This study examines the impact of changes in teacher behavior upon the level of expressive student (classroom) engagement while developing practical methods for behavior change and pupil feedback that are sensitive to the uniqueness of individual classroom interactions.

Theoretical Rationale

Reform in teacher education has concentrated on restructuring training programs (Smith, Cohen and Pearl, 1969; Combs, 1968) or on developing teacher qualities which are assumed to be desirable and helpful in promoting student motivation and learning (Borg, Kelley,

Langer and Gall, 1970; Berliner, 1969; Joyce, 1967). Most of these approaches evaluate results on the basis of criteria established by outside agents (supervisors, educational theories, etc.). Many of them do not include pupil behavior as an important outcome.

Some attempts have been made to deal with pupil responses by studying the interaction between teachers and their students. Flanders (1964) developed Interaction Analysis to provide teachers with an analysis of the effects of their own teaching behaviors on pupils. These effects, however, are often based on assumptions that certain behaviors on the part of the teacher lead to positive interactions; seven of Flanders' ten categories measure teacher verbal behavior while only two deal with pupil talk. Davidson (1967) used a modified interaction analysis system to study the effects on pupils' level of thinking when teachers were provided with objective feedback data from their instruction in reading. He found that pupils made more critical thinking responses, fewer literal responses, and fewer nonproductive responses when their teachers received feedback.

A few studies have shown that students can strongly influence teacher behavior. Gage, Runkel and Chatterjee (1960) demonstrated that when teachers were given data based on pupil ratings of their teacher and an ideal teacher they changed their behavior to more closely approximate pupil ratings of the ideal. Jenkins and Deno (1969) determined that student classroom behavior was a powerful influence on teachers' self evaluation. When student "actors" showed interest and excitement their teachers found teaching enjoyable, predicted they would be

effective teachers, and thought that their students learned more than the teachers whose students acted uninterested and unexcited. The authors suggest that teachers suspend judgments of their effectiveness until trained to assess student behavior objectively. A supporting study by Klein (1971), whose experimental conditions were similar to those of Jenkins and Deno, also showed that student behavior influenced the verbal and nonverbal behaviors of teachers. Criteria used for evaluating teacher changes were taken with an interaction analysis instrument from classroom observations of teacher behavior.

These findings suggest that teacher and pupil behavior affect each other. The question of whether or how much student engagement can be positively affected by manipulating the occurrence of specific teacher strategies remains unanswered. It is the purpose of this study to shed some light on this question.

Definition of the Research Problem

Hess (1973) studied low-income classroom settings to identify and describe strategies teachers use which are associated with high levels of student attention and involvement (engagement). Teachers and pupils were observed simultaneously and behavioral indicators of student engagement were matched with teacher use of twenty-three verbal and nonverbal strategies. An assessment of the relative effectiveness of each strategy was made.

The Hess data provide the background for this study by describing strategies and engagement found in low-income classrooms.[1] The logical extension of this is a) to manipulate teacher use of various

[1]The study referred to as Hess (1973) summarizes the results of work done in 1971-72.

strategies to determine their relationship to student engagement; and b) to discover ways the data from the larger study have meaning for individual teachers on a practical, applied level.

Sidman (1960) supports the rationale for exploring the conditions under which a phenomenon occurs as a means of building a foundation of specifics upon which scientific investigation can rest. He suggests that such data are of consequence only insofar as they establish or refute the soundness of other data. Experiments are important not only to test hypotheses but to collect data for theoretical formulations. The latter function is especially useful in clearing away the cobwebs and building firm foundations in the mass of current educational research.

The fact that teacher behavior can be changed with techniques of behavior modification has been well documented (Baer, Wolf and Risley, 1968; Cooper, Thomas and Baer, 1970; Schutte and Hopkins, 1970; etc.). This study concentrated on the amount of change in the two chosen strategies and on what effect changes in strategy frequency had upon student engagement.

The independent variables of the first aspect of the study were using feedback and reinforcement to change teacher behavior; the dependent variable was teacher use of two selected strategies. The second aspect employed teacher use of two selected strategies as the independent variable and expressive student engagement as the dependent variable.

The specific questions posed were:

1. How much can selected strategies be altered with the use of feedback, reinforcement, and other established behavior modification techniques?

2. Are there systematic changes in student responses as a result of changes in the teacher's behavior?

3. What are the problems encountered as a result of applying data from a large group design to individuals?

4. Is the method of this study feasible for in-service training?

Treatment Rationale

Training teachers to use selected strategies involved three aspects: (1) setting goals, (2) planning increases in selected strategies in daily lessons, and (3) receiving daily feedback on positive or negative consequences of strategy use on student engagement. In this study student engagement is defined as student attention and task involvement.

Teachers were informed of all phases of the research and took an active part in all planning sessions. The concept of experimentally manipulating variables and examining outcomes was shared with them. The importance of this approach when dealing with training methods has been eloquently expressed by Argyris (1968). He states that research in field settings should involve subjects directly. It should motivate them by being relevant to their needs and by providing them with profits beyond ordinary feedback of results.

Receiving daily feedback in relation to established goals is seen as critical to success in changing teacher behavior. Biel (1962) and MacPherson, Dees and Grindley (1948) demonstrated that the role of feedback was a prerequisite for improvement or change but worked successfully only when accompanied by clearly defined goals. Feedback alone does not reinforce learning. The learner must be aware of how much closer to the desired goal each of his attempts is.

Other studies lend further support to the value of immediate feedback. Packard (1970) found that teachers skeptical of behavior modification techniques gave the experimenters full cooperation when they became aware of dramatic changes in student behavior. Hall, Lund, and Jackson (1968) informed teachers participating in the research of daily pupil progress by showing them charts of observed behaviors. In addition, weekly conferences were held in which procedures were discussed and teachers praised for bringing about desired changes in pupil behavior. Although this procedure was incidental to the study, it seems to have been of central importance to its success. Three beginning teachers who were having trouble with classroom control were trained by Hall, Panyon, Robon, and Broden (1968) to reinforce classroom study behavior systematically. Data on the study behavior of pupils in each class were recorded by trained observers. Part of the treatment consisted of the daily presentation of these data to the teacher. This approach seemed to be extremely effective in changing teacher behavior.

Feedback to teachers in this study will be based on behavioral

observations of the students. This approach is supported by the work of Tuckman and Oliver (1968) who examined feedback as a function of source. One group of teachers received feedback only from students, a second group from supervisors only, a third group from both students and supervisors, and a fourth group, which served as a control, received no feedback at all. The results (measured by student ratings across a twelve week interval) showed that feedback from students led to positive changes in teachers. Supervisor feedback combined with student feedback added nothing, while supervisory feedback alone led to changes in a negative direction when compared to the control group. The experimenters concluded that teachers were defensive and even hostile to supervisory attempts to shape their behavior. The best source of feedback appears to be the students, although this is often overlooked in teacher training. This study used behaviorally based student feedback as a basis for changing teacher behavior and for the maintenance of those changes that have positive effects.

Rationale for the Experimental Design of the Study

An n=1 format with replications was chosen as the most effective experimental design for meeting the objectives of this study. The work of Hess (1973) made available important generalities about teaching strategies and their association with different levels of pupil engagement. This study seeks to expand his work by exploring possible causal relationships between selected strategies and student engagement and by developing a widely applicable method for training teachers that is sensitive to individual strengths and weaknesses. A

comparative group design would be inappropriate because the results are often not applicable to individual patterns of behavior except to the extent that they conform to hypothetical averages (Zifferblatt, 1972). Since this is an attempt to develop individualized training programs, normative comparisons are irrelevant.

N=1 designs are based on as rigorous research methods as their statistical counterparts. They both involve systematic data collection, observation, experimental control, and analysis and synthesis of data (Frey, 1972; Lackenmeyer, 1970; Holt, 1970). One major difference between the two approaches is that a comparative research design is relatively inflexible and must be carried out as originally planned. It doesn't account for unforeseen events. In contrast, an n=1 design allows the experimenter to stop at any time to (1) examine interesting discoveries, (2) correct methodological flaws, and (3) to vary experimental conditions in his search for optimal results (Skinner, 1956).

The main focus of the n=1 design in this study was to show that observed changes in pupil behavior resulted from the treatment intervention (e.g. changes in teacher use of selected strategies) and not some uncontrolled variable. Several techniques were adapted and applied to individuals since the aim was to develop an effective program for changing behavior and assessing the outcome (Hannum, 1972). Individual variance was studied carefully to determine its source and influence on treatment variables, not eliminated or averaged out as between subject variance in group studies (Browning and Stover, 1971).

The study of individual variability can make an important

contribution to general educational research, especially when applied to confusing or contradictory results of field studies. This kind of research, while seldom producing spectacular findings, functions to establish a reliable methodology for the pursuit of more general problems (Sidman, 1960).

The results of an n=1 study can not be generalized to a larger population, but this is not the objective here. The importance of this approach for general use is in the development of flexible training methods that are widely applicable while accounting for individual differences.

CHAPTER II

DESIGN OF THE STUDY

Overview

This study was an attempt to increase teacher use of selected strategies and to examine the impact of the increases on expressive student engagement levels in natural classroom settings.

A base rate of teacher use of the strategies and of the level of student engagement was measured during the first eight days of observation (16 sessions). Following this, a trainer worked intensively with a teacher to increase the use of one strategy for five days (10 sessions). Classroom observers charted the frequency of strategy use and student engagement levels and gave the teacher daily feedback and training. This process was repeated for the second strategy. Replications occurred with two other teachers following the same procedure and reversing the strategy order in one case as a check for possible additive effects. At the end of the 18 day (36 session) experimental period, teachers were given training in collecting behavioral data on student engagement levels. A two day (six session) follow-up again monitored and charted the use of both strategies and student engagement levels 14 days after the experimental period to assess longer term results of the treatment intervention.[1]

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[1]The author's original plan included three selected strategies to be counterbalanced by the three teachers, a 10 day baseline, and a three day follow-up. The revisions were dictated by economic constraints.

The Sample

The teachers in the sample were selected from the group of 24 3rd and 4th grade teachers who participated in the Hess study of teacher strategies and student engagement in low income areas during 1971-1972. Three interested teachers whose strategy profiles for 71-72 showed low occurrences of the selected strategies were chosen for the present sample.

A sample of ten pupils was chosen from each classroom. Each teacher picked pupils they had diagnosed as potential academic or discipline problems. The same pupils were watched consecutively throughout the experiment so that individual patterns of expressive student engagement could be analyzed.

Instrumentation and Procedure for Collecting Data

The instruments used in this study were designed specifically for the Hess project on teacher strategies and student engagement.

The Teacher Strategies Observation Instrument lists 23 strategies derived from theory and research on human learning, motivation, and teaching. A list of all the strategies with definitions, examples, and a copy of the instrument can be found in Appendix A. Two of the 23 listed categories were studied.

The Student Engagement Observation Instrument provides behavior-based measures and global assessments of student engagement in the classroom. The sex, ethnicity, direction (the nature of the task to which the pupil is attending) and grouping (small, large, or dyadic) for each child is also recorded. A list of the behavioral indicators

with definitions, examples, and a copy of the instrument will be found in Appendix B.

An engagement score was plotted across the sample of 10 pupils to provide an average measure of the level of engagement at any given time. This score could range from 0 to +2 and was used as a quick assessment of the effect of changes in teacher behavior in order to give the teacher immediate feedback.

Trained observers collected the classroom data. Two observers attended each observation session: one monitored student activity, the other observed the teacher. The observers were informed of all aspects of the research and consulted the teacher daily with the Experimenter in individually arranged training sessions to provide feedback and discuss strategy use for the next session.

Description of the Independent and Dependent Variables

The two strategies of interest in this study were Personalizing the Task (PT) and Recognizing Individual Achievement (RIA). They functioned as dependent variables when changing teacher behavior with feedback and reinforcement was the independent variable, but became independent variables when expressive student engagement was used as the dependent variable.

PT and RIA were selected for this study because of their potential for providing individual and relevant learning experiences for students. It is this experimenter's bias that such an approach may be particularly rewarding in low-income classrooms. The frequency of the occurrence of these strategies during 10 hours of observation

in the Hess study was quite low (Hess, 1973). One of the questions posed for this study was whether increases in these strategies would be associated with increased expressive student engagement. Both strategies and engagement were defined as observable behaviors; thus frequencies could be accurately quantified.

Personalizes the Task is a strategy which transposes academic concepts into comprehensible terms by relating them to the students' or the teachers' personal experience. An example would be teaching map reading by having students locate their own homes on a detailed city map.

Recognizing Individual Achievement is an affective feedback strategy which indicates to the student that he has performed well, made an unusual contribution, or has in some way accomplished more than the usual standards of accomplishment. For example, the teacher might tell a child he has done such a great job on his arithmetic and understands it so well that she would appreciate his helping a child who is having trouble.

The strategies chosen are less tightly controlled than those normally manipulated in an intensive experimental design. They were picked in the context of the larger Hess design from which they were selected. It was decided to sacrifice the exacting precision of a narrowly defined variable in order to examine how this approach would work in a natural setting.

The dependent variable for the second aspect of this study was the expressive engagement level of the student sample when a

selected strategy use was increased by the teacher. Expressive engagement is defined as active involvement (motor or verbal) by the student in the attention or involvement process. The time of day and the type of lessons observed were held constant to minimize competing factors in the experimental situation. Language Arts and Math were the lessons studied as they were the two subjects taught daily in which the whole class could easily be grouped together.

The frequency of occurrence of both student engagement and teacher use of strategies were plotted and graphed daily to provide immediate knowledge of results for teachers and experimenter.

Data Collection and Treatment Procedure

A baseline of teacher strategies and student engagement was recorded during the first eight days (16 sessions) of observation. This extended period was necessary to calculate a stable base rate in the complexities of a natural setting further confounded by the presence of observers (Browning and Stover, 1971).

Following the establishment of base rate behaviors, each teacher was presented with the baseline data collected in her classroom. Daily goals were set for increasing a selected strategy and specific suggestions for implementation were discussed. The teacher received daily feedback both on her performance (rate of occurrence of strategy compared to base rate) and on concurrent levels of pupil engagement. This process was repeated for the second strategy. Replications of this design occurred with two other teachers for one of whom the sequences of strategies were interchanged as a check for

practice and additive effects. Reversal techniques were not used to establish causality because they present both ethical and practical problems in school settings.

A two day (four session) follow-up observation period monitored and charted the use of the two strategies and expressive student engagement levels two weeks after the experimental sessions were completed.

During the course of the experiment an anecdotal log was kept by the experimenter and some observers. Unanticipated factors, changes in procedure, teacher and observer reactions, and decision-making processes were recorded in the log.

Inter-Observer Agreement

An index of inter-observer agreement for this study was obtained from data provided by an additional observer (calibrator) in the classroom during four of the observation times. The calibrator rated behavior simultaneously with an observer for 10 minutes using the Student Engagement Instrument or the Teacher Strategy Instrument. Each observer was calibrated twice on each instrument, once during the collection of baseline data and again during the experimental period.

Observer and calibrator agreements and disagreements on each instrument were tallied and Scott's (1955) formula was applied to obtain a percentage of agreement figure. This procedure allows for a correction for chance agreement in the final figure.

Inter-observer corrected percentage of agreement for all

strategies on the Teacher Strategy Instrument for the baseline data collection was .84 for all observers combined. The range was from .80 to .96. During the experimental period the mean was .88 and the range was from .84 to .94.

Inter-Observer corrected percentage of agreement for all categories on the Student Engagement Instrument for the baseline data collection was .82 for all observers combined. The range was from .76 to .90. During the experimental period the mean was .90 and the range from .78 to .98.

Tables showing all the percentages for each strategy in the teacher instrument and each category in the student instrument are included in Appendix C.

Analyses

Since the focus of this study was on individual variability rather than statistical prediction, the data were analyzed by simple graphic presentations. Figures 1-3 show teacher strategies and student engagement for each of the sample teachers. Figures 4-5 illustrate the intensity level of the student engagement recorded.

Each occurrence of teacher use of selected strategies was added per day and across all the days for a specific period, then divided by the number of days in that period. For example, Figure 1 shows for Teacher 1 that in language arts she used PT an average of five times per period during the eight day baseline period and an average of 58 times per period during the five day PT experimental period.

The procedure for calculating student expressive engagement was 1) to add the number of occurrences of expressive engagement for each observation period, 2) to divide each total by the number of observations made in that session (e.g. ideally 90 but often less due to absence, etc.), 3) to add the daily computations together for each period (eight for baseline, five for each experimental period, two for follow-up) and 4) to divide the total for each period by the number of days in that period for an average percent of expressive engagement.

Percentages were computed because of possible absenteeism among the student sample. For example, Figure 1 shows that the student sample in the class of Teacher 1 during the baseline period (in Language Arts) was expressively engaged 42 percent of the time observed. During the PT experimental period they were expressively engaged 62 percent of the time.

A second analysis of engagement is concerned with changes in the levels of intensity (see Figures 4 and 5). Each observation of engagement was scored with a +1 or a +2 to indicate the level of intensity of engagement (+1 standing for interest and involvement and +2 standing for intense interest or involvement). Figures 4 and 5 show the daily percentage of +2 scores for the sample students (Figure 4 refers to Language Arts and Figure 5 to Math).

Teacher 1

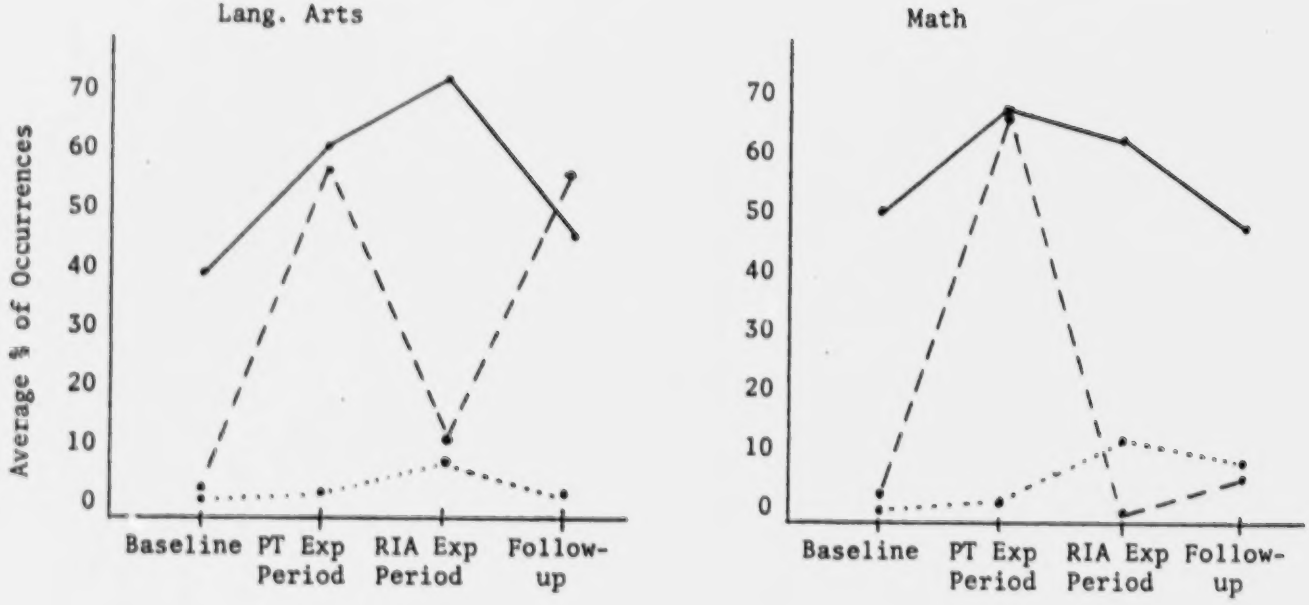

Figure 1

TEACHING STRATEGIES AND STUDENT ENGAGEMENT

Teacher 2

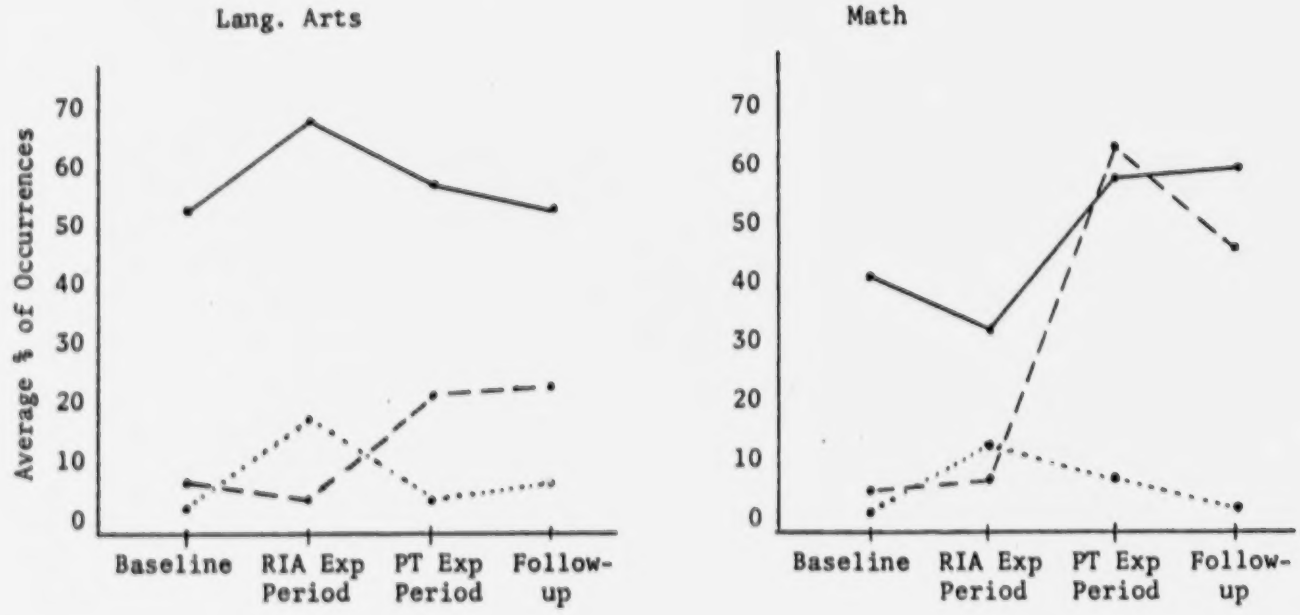

Figure 2

Teacher 3

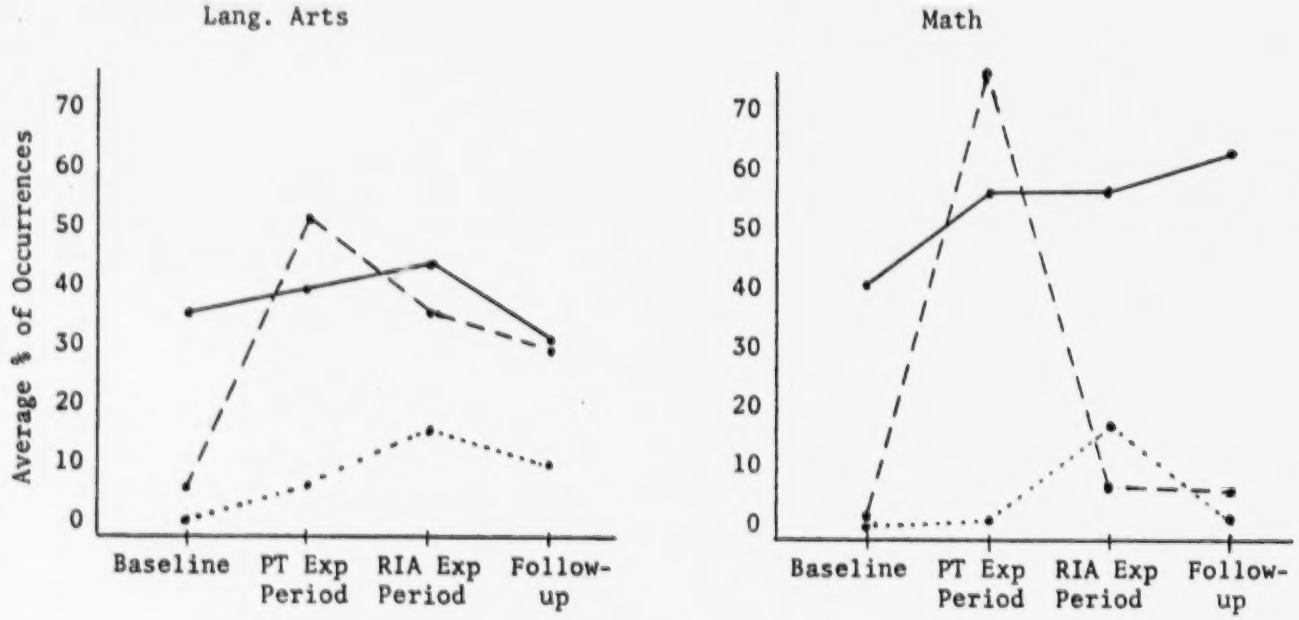

Figure 3

PERCENTAGE OF TWO RATINGS ON EXPRESSIVE GLOBAL ENGAGEMENT

Language Arts

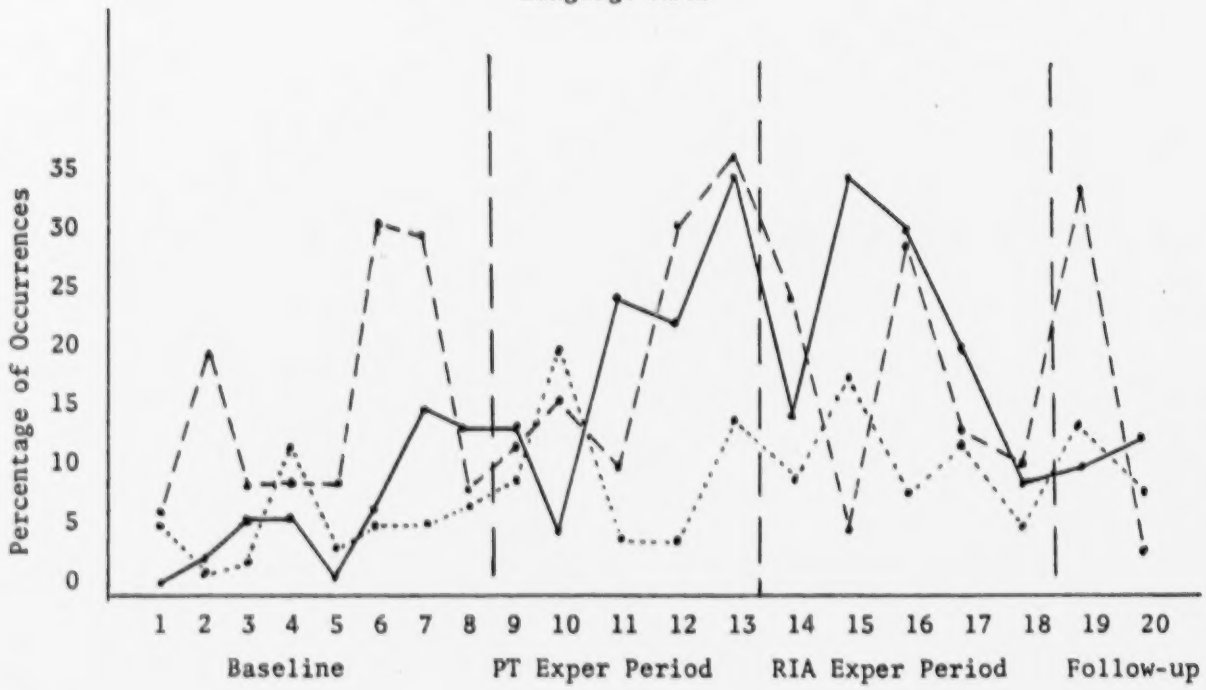

Figure 4

——— Teacher 1

– – – – Teacher 2

..... Teacher 3

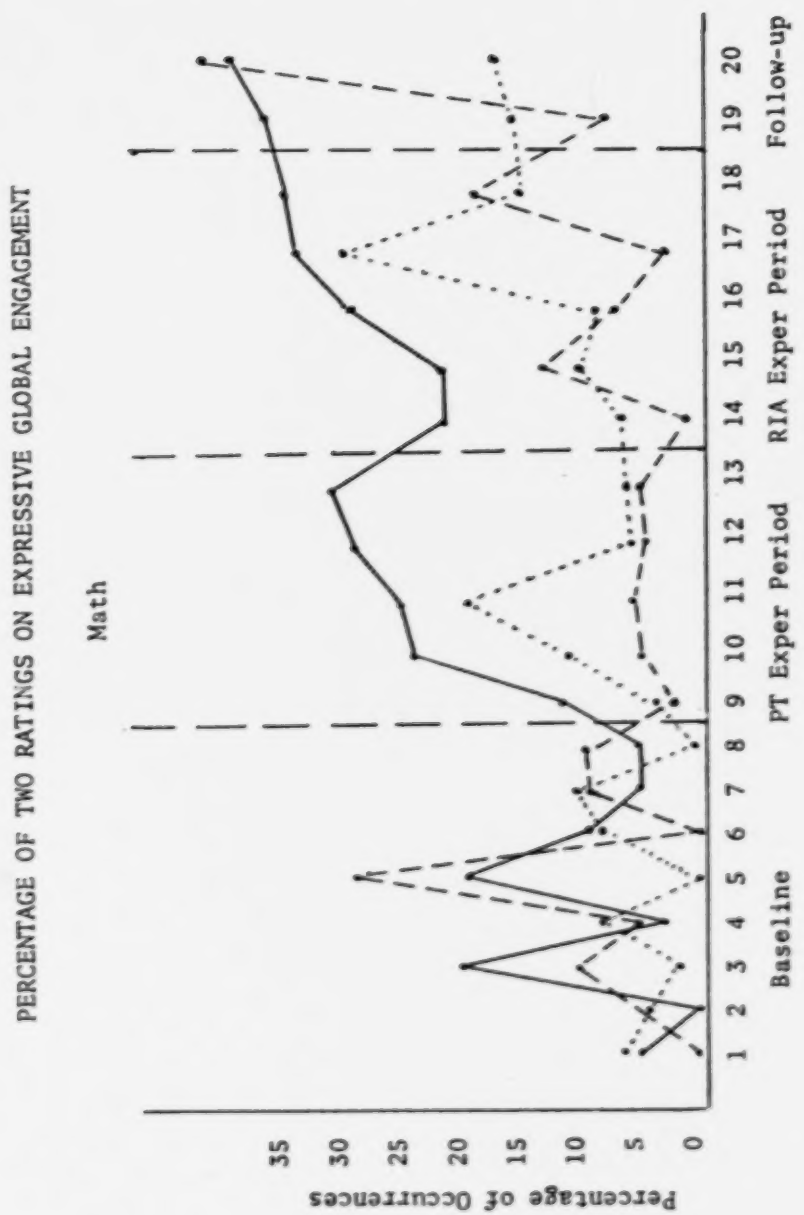
PERCENTAGE OF TWO RATINGS ON EXPRESSIVE GLOBAL ENGAGEMENT
Math
Percentage of Occurrences
0
5
10
15
20
25
30
35
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Baseline
PT Exper Period
RIA Exper Period
Follow-up
Teacher 1
Teacher 2
Teacher 3

Figure 5

CHAPTER III

RESULTS AND DISCUSSION

Impact of Intervention on Selected Strategy Use

The data show that both selected teacher strategies were increased with feedback and training. All three teachers increased their use of Personalizing the Task during the experimental periods in Language Arts and Math (see Figures 1 and 3). The increases from baseline to experimental periods extended from 14.4 (with a range of 8 to 48) to 73.9 (with a range of 53 to 90) mean occurrences per observation period. The three teachers also increased their use of Recognizing Individual Achievement during the experimental periods in Language Arts and Math (see Figures 1 and 3). The increases from baseline to experimental periods extended from 6.8 (with a range of 5 to 11) to 13.8 (with a range of 8 to 19) mean occurrences per observation period. Differences in subject matter did not seem to be a great influence on the use of the two strategies except that PT was greatest in Math during the experimental periods and was lower than Language Arts in the follow-up (Figures 1 and 3).

It will be noted that PT changed much more dramatically than RIA. PT appears more amenable to change than RIA. All three teachers complained that they felt RIA was contrived if done oftener than occurred naturally for them. They strongly resisted using more RIA. Teacher 1 said she felt it went against her character to give praise

in public because she usually reserved it for private conferences. Observers also reported that increases in RIA seemed "out of character" for Teacher 2.

This difference may be a function of the nature of the two strategies. It is possible that the changes are more equivalent than the graphs illustrate. PT is a more global strategy--it can be an entire lesson and once set in motion it can run continuously throughout the period without conscious teacher effort. RIA is more specific in that it involves communicating exclusively with individuals, is not part of the lesson plan, and is difficult to use frequently without sacrificing the class as a whole and without becoming redundant or phoney.

This situation exemplifies one of the problems of implementing pure experimental designs in a natural setting. Intervening enough to equalize the strategy frequencies would have distorted the natural setting beyond recognition. The aim was to deal realistically with behavior that occurs spontaneously in a normal classroom.

Relationship Between Strategy Changes and Engagement

Global changes in engagement levels (Figures 1, 2 and 3) show the percentage of time the students were expressively engaged. These data show a slight upward trend in expressive engagement when selected strategies are increased.

Changes in the intensity level of expressive engagement are shown in Figures 4 and 5 which chart the progression of expressive engagement rated at a 2 level of intensity. Again, the variability

is pronounced: for some teachers at certain times intensity 2 ratings increased during the experimental periods. There is some evidence that 2 ratings will stay consistently higher in different subject matters for different teachers. For example, Teachers 1 and 3 had more 2's in Math than Teacher 2. Teacher 2 had more 2 ratings in Language Arts than in Math.

The data do not show a clear relationship between strategy changes and expressive student engagement. So much variability exists that changes in expressive student engagement as a result of changes in teacher behavior seem to be different for each individual and in each situation (see Figures 1, 2 and 3). Teacher 1 had the most noticeable change in expressive student engagement as a result of her experimental behavior. Expressive engagement rose dramatically in her class. Teachers 2 and 3 had more variable results even though Teacher 3 showed the largest increase and retention of PT of all the teachers. It is clear that the increased frequency of strategy use by teachers in this study did not consistently affect the expressive engagement level of the students.

Problems Encountered with an Experimental Design in a Natural Setting

A number of problems encountered in applying experimental techniques to a natural setting involved teacher variables. All three teachers reported changes in mood due to weather conditions, day of week, time of day, and frustration with individuals. Observers noted distinct differences in the emotional tone and learning climate of

each class. All of these variables influenced the way teacher strategies were received by the students. Even though all teachers used the selected strategies very little during the baseline and all increased usage during the experimental periods, individual differences in style and expression appeared to produce differential results for each teacher. For example, it was reported by observers that one teacher repeatedly used RIA as a tool for subtle discipline of the class or as a command to get the class to the level of control she desired. She would say things like, "So and So is working so well and has already finished the first problem. Why can't the rest of you do as well?" Negative feedback from observers had no apparent effect on this behavior.

All the teachers increased their use of PT substantially; some relinquished their control over the class much more than others while doing so. Teacher 1, for example, established a climate in which the students were free to express themselves even though she had some reservations about the change. Teacher 3 used PT extensively but never really "let go" of her control of the situation. This anecdotal data suggests that factors other than the simple strategy frequency strongly influence student reactions and may account for some of the contradictions in engagement findings.

A second group of problems were student related. The fact that a stable base level on expressive student engagement was not established and that variability was apparent throughout all the observation periods indicate that parameters other than teacher

strategies were at work. Obvious differences in achievement and skill levels may account for part of the variability here.

Another set of problems relates to the difficulty of measuring expressive student engagement in a natural classroom setting. The need for sampling precludes recording the moment-to-moment engagement of an individual child. Student engagement can also be a function of variables such as interactions with other students, physical and emotional states, attention needs and home conditions. It is extremely difficult to isolate the variables affecting the student other than those directly executed by the teacher. This situation is further complicated by the necessity of sampling ten different students during an observation time.

Another problem in gathering engagement data is that some children learn early to look and act as if they were engrossed in a task when in fact they are not. Thus the behavioral indicators on the Student Engagement Instrument may be misleading in some cases.

In addition, individual differences in student responses may make objective quantification of intensity 2 ratings almost impossible. For example, cautious hand raising for a timid child may well be an indication of intense engagement, while energetic motion from a chronic arm-waver may express moderate or low engagement. In the observation procedure, however, these differences would not be recorded accurately because the focus is on the behavior itself.

Discussion

The results of this study indicate that it is much easier to

increase teacher behavior with feedback and training than to affect expressive student engagement with strategy change. Obviously, a teacher has more control over her own behavior than that of her students and is therefore more susceptible to prediction and change. In addition, working with the teacher involves a one-to-one interaction not possible with a sample of pupils. Student behavior may be affected by many variables other than teacher behavior. Therefore, it is not possible to predict student behavior as a function of teacher behavior in a natural setting with behavioral indicators such as those used in this study.

These conclusions are supported by the tremendous variability in student data. Table 1 shows individual patterns of engagement (mean E), +2 intensity ratings (mean +2), and engagement fluctuations (mean /) (number of times the engagement level changed during an observation) for the student sample in Teacher 3's class. Student 1, for example, in Language Arts during the RIA Experimental period had a mean engagement level of 1.1, a mean +2 intensity level of 1.6, and a mean fluctuation rate of 3.6. Figure 7 graphs the profiles of the pupil with the lowest number of fluctuations in engagement (student 8) and the pupil with the highest number of fluctuations (student 9). In both cases, much fluctuation in engagement occurs. The variability is as much in evidence during the baseline as during the experimental periods, indicating that other parameters are at work.

Expressive student engagement as it has been defined in this study, can be seen as the result of a complex set of variables, some

Table 1

Mean Engagement Levels and Fluctuations for
Sample #3 in Language Arts and Math

Language Arts

Student #	Baseline			PT Exper. Period			RIA Exper. Period			Follow-up		
	Mean E	Mean +2	Mean /	Mean E	Mean +2	Mean /	Mean E	Mean +2	Mean /	Mean E	Mean +2	Mean /
1	.77	.63	3.88	1.06	1.2	2.6	1.1	1.6	3.6	1.17	2.0	3.5
2	.90	.43	3.0	.92	.33	2.33	1.14	1.4	1.8	1.0	.5	1.0
3	.80	.63	4.63	1.05	1.2	2.0	1.0	.50	2.0	1.1	.5	1.0
4	.86	.63	1.63	1.01	1.0	2.4	.88	.80	2.6	.94	.5	1.5
5	.75	1.0	5.5	.90	2.0	2.0	.85	.67	2.67	1.0	1.5	4.5
6	.69	.25	3.0	.66	.4	2.6	1.0	1.25	3.5	1.1	1.5	2.5
7	1.0	.63	1.75	1.06	1.4	3.0	1.14	1.4	2.2	1.17	1.5	2.5
8	1.0	.75	1.75	1.13	2.0	3.5	1.04	.40	.40	1.1	1.0	2.0
9	.77	.25	2.75	.86	1.0	4.6	1.0	1.6	3.8	.72	1.0	4.5
10	.93	.50	3.13	1.1	1.8	3.4	1.16	1.6	2.6	1.2	2.0	3.0

Table 1 (Continued)

Math

Student #	Baseline			PT Exper. Period			RIA Exper. Period			Follow-up		
	Mean E	Mean +2	Mean /	Mean E	Mean +2	Mean /	Mean E	Mean +2	Mean /	Mean E	Mean +2	Mean /
1	.84	1.25	4.5	.95	.40	1.8	.94	1.0	3.8	1.28	4.0	5.0
2	.87	.14	2.2	1.06	1.0	2.0	1.08	1.4	3.0	.87	.5	2.5
3	.94	.75	3.38	1.1	1.4	2.0	1.1	2.3	3.0	1.28	3.0	3.0
4	1.0	.25	.53	1.08	1.2	2.0	1.0	.8	2.0	.89	1.0	2.0
5	.57	0	3.5	.72	1.0	5.0	.97	1.7	4.0	1.0	1.0	2.0
6	.92	.63	2.3	1.06	1.4	3.2	1.07	1.8	3.8	1.06	1.0	2.0
7	.92	.63	2.6	.95	.4	2.0	.84	.6	2.8	.94	1.0	3.5
8	.94	.63	2.3	1.0	.25	1.0	.92	.8	2.2	1.12	2.0	3.5
9	.53	.25	3.5	1.0	.80	2.0	1.1	2.2	3.8	.83	0	2.0
10	.80	.38	2.4	.88	.80	3.6	.95	1.0	3.4	1.1	1.5	4.0

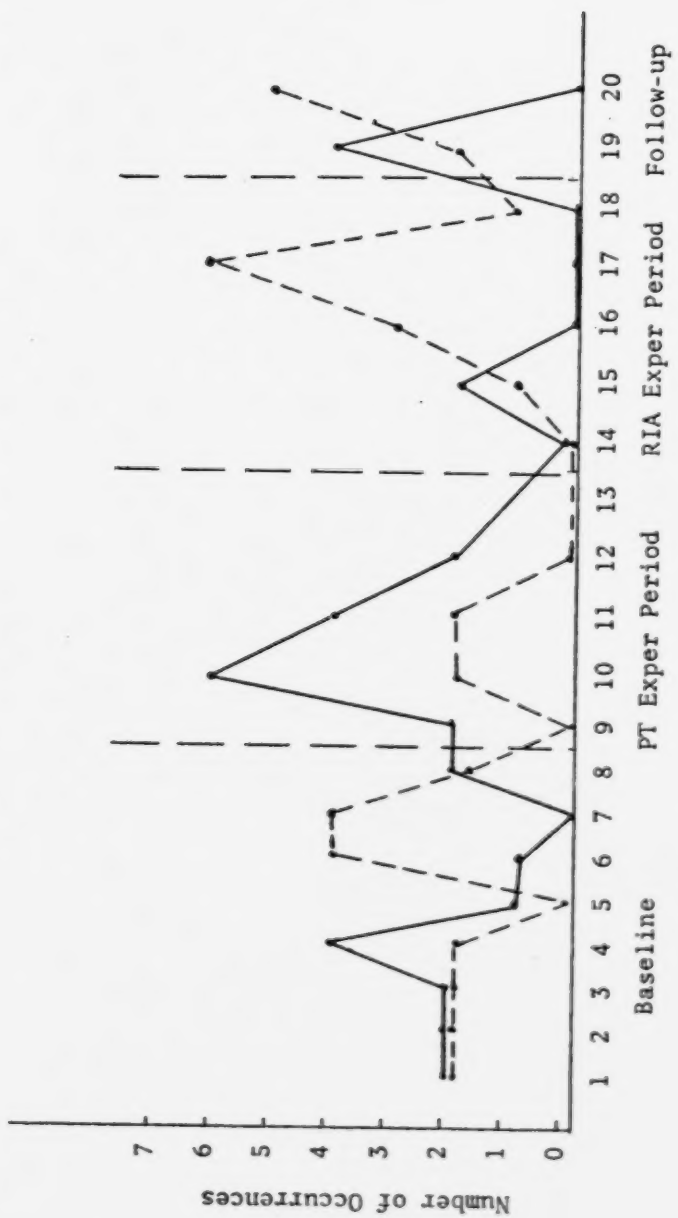
ENGAGEMENT PATTERN OF THE LEAST FLUCTUATING STUDENT
Number of Occurrences
0
1
2
3
4
5
6
7
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Baseline
PT Exper Period
RIA Exper Period
Follow-up
Language Arts
Math

Figure 6

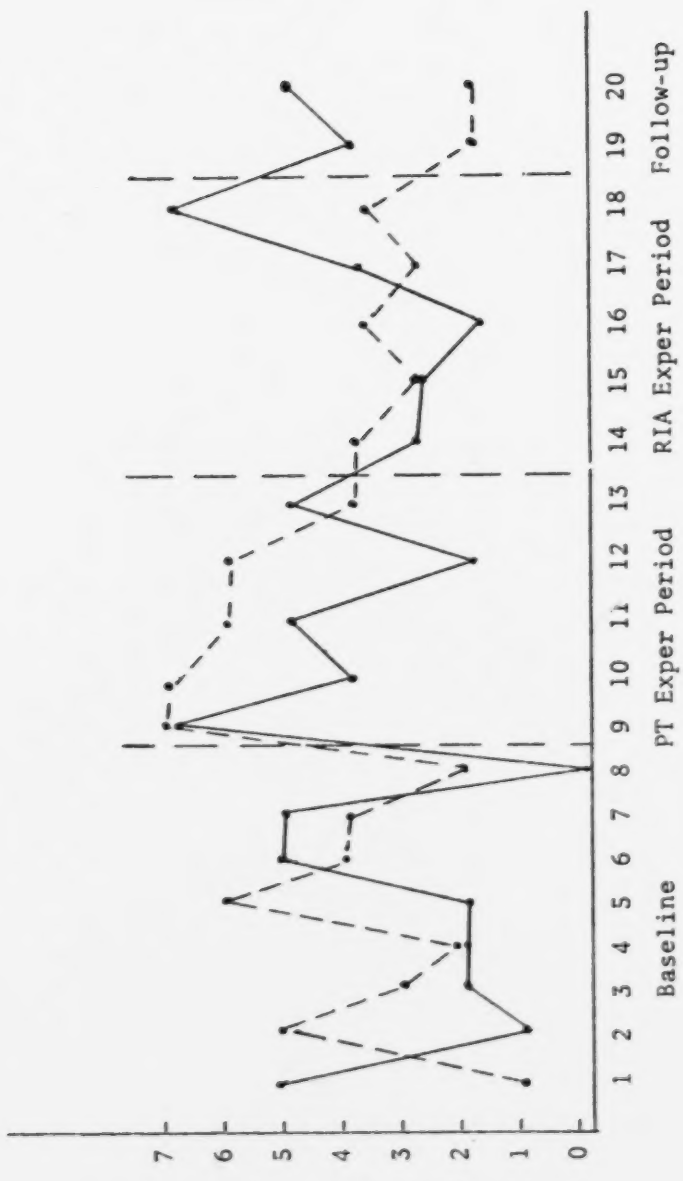
ENGAGEMENT PATTERN OF THE MOST FLUCTUATING STUDENT
Number of Occurrences
0
1
2
3
4
5
6
7
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Baseline
PT Exper Period
RIA Exper Period
Follow-up
Language Arts
Math

Figure 7

of which have been discussed earlier in this report. Isolating and measuring single variables, other than relatively simple teacher behavior, is extremely difficult, but may be essential to an understanding of the dynamics of natural settings (Sidman, 1960).

There is, however, a basic dilemma facing experimental workers in natural settings. Isolation and control of variables affecting both student and teacher behavior may well be essential for measurement, but the process of achieving such control can destroy the validity of the findings and make generalization practically impossible. In this study, for example, it would have been possible to train all three teachers to use the strategies under consideration in precisely the same way, thus eliminating one source of variation. However, this procedure would also place some limitations on the usefulness of the training technique with other teachers, since the objective was to develop a technique for change that could be helpful to a teacher with a minimum of "outside" intervention.

Another aim of this study was an in-depth examination of teacher strategies and student behavior in light of the findings of the larger Hess (1973) study which involved 23 strategies and 24 classrooms. The lack of clear patterns of strategy-engagement relationships reported by Hess may be a result of the individual differences and resultant variability demonstrated for both students and teachers in this study. The anecdotal material on teacher strategy use clearly indicates unquantified differences among teachers. The intensive charting of engagement levels of students over time amply

demonstrates the existence of other variables at work in the classroom.

In summary, it seems clear that in spite of the elaborate instrumentation of both the current study and the Hess (1973) project, teacher strategy use cannot be shown to have predictable effects on expressive student engagement. It is possible that more global strategies which would distinguish between teachers on the "how" of strategy use would produce more predictable effects, but this area, as well as the multiple variables associated with student engagement, remains as a consideration for further research.

Implications for In-Service Training

Teaching is a very complex process. Given this fact, it seems reasonable that pre-professional training alone will not be sufficient to insure continued skill growth in practicing teachers. At the same time, teachers are very suspicious of in-service training that is not directly relevant to what they do in their every-day classroom situations.

This study demonstrated to teachers that it was possible to modify their instructional techniques by objectively monitoring student responses in their classrooms. The method used was valuable in giving the teacher an objective view of her influence on her class. In the isolation of the classroom, teacher perspectives can become narrow and awareness of the effect of teacher behavior on students may be lost.

The teachers in this study reported that they were not always sensitive to the cues of the class in determining possibilities and

limitations of different presentations. For example, Teacher 1 tended to judge the engagement level of her class by the amount of noise in the room. She admitted her desire to dominate, yet was able to see with feedback that when she relinquished some control the class responded with enthusiasm. She finally stated that perhaps the perfect order she usually kept was not necessarily the ideal state in the classroom. The feedback and interaction with the observers was very important in her feeling comfortable with the new classroom climate.

All the teachers enjoyed this project and the feedback it gave them. They seemed to be motivated and stimulated by ideas from the observer/teacher interaction and reported that ideas were not imposed upon them. They chose ideas and implemented them in their own styles and in conjunction with their existing lesson plans. None reported feeling "pushed" or complained about an extra work load.

This model seems to be very useful for in-service training in that it deals with the individual teacher and her relationship to the class. The teacher is not made to feel that she should conform to a style that is not right for her, but her own strengths and weaknesses are the basis for suggested change. Making a staff of observers available to teachers to record their behaviors and associated levels of student engagement might be a very useful way of improving instruction in classrooms. It would meet the scientific criterion of objective quantification and the practical criterion of immediate relevance.

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APPENDIX A

(1) Teacher Strategies Observation Instrument

(2) Teacher Strategies: Definitions and Examples

STANFORD R&D CENTER - PROJECT 3C
TEACHER STRATEGIES OBSERVATION INSTRUMENT
DATE_____

ROUND_____TIME_____
TEACHER_____
LESSON_____

OBSERVER_____

PAGE_____OF____

	Stimulus/ Variation and Change					Task Structuring						Evaluating					Affective						Admin. Man.		
TIME	SVC	S/N	KMM	TVS	MOV	O	CHO	SE	SUM	I	PT	SQ	CHL	F	CT	COM	P	S/L	PHY	LIS	SUC	RIA	AM	D	OTHER
1																									
2																									
3																									
4																									
5																									
6																									
7																									
8																									
9																									
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SUM																									
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10																									
SUM																									

TEACHER OBSERVATION INSTRUMENT

Strategies will be marked with a ✓for positive action and a — for constraining behavior.

STRATEGY	DEFINITION
Stimulus Variation Change	Teacher initiates change in activity and/or subject matter. Examples: 1. Teacher introduces a math lesson by writing examples on the board, then has students work with geoboards. 2. Teacher changes lesson from math to reading.
Surprise/Novelty	Teacher does something out of the ordinary to arouse the curiosity and attention of her students. Examples: 1. Teacher uses poetry to illustrate history of contemporary problems. 2. Teacher breaks routine by playing music to accompany the lesson.
Kinesthetic Manipulation of Materials	Teacher involves students in activities or tasks requiring the manipulation of materials. Examples: 1. Students using geoboards, blocks, cuisinaire rods. 2. Student manipulates other students in front of the class to demonstrate a math problem.
Teacher Use of Visual Stimuli	Teacher uses visual stimuli to facilitate the lesson. Examples: 1. Teacher uses charts, pictures, overhead projector. 2. Teacher writes on blackboard.

Movement — Teacher moves from one place of position in classroom to another in order to facilitate the task or to interact with student in task related situation.

Examples:

1. Teacher checks on seat work.
2. Teacher walks around room from student to student when teaching a lesson.

Orients — Teacher explains what the lesson will be about, how it is related to what they have already learned and what will be expected of them.

Examples:

1. Teacher tells students about the game they are going to play and why.
2. Teacher discusses with students what is planned for today.

Choice — Teacher offers choices to students for self structuring of tasks.

Examples:

1. What would you like to do today?
2. Would you like to use the listening center or the math center?

Statement/Explanation — Teacher describes or explains task, reads from a book, or answers a student's question in informative terms.

Examples:

1. 2 + 2 = 4 and 4 - 2 = 2
2. Abraham Lincoln was a great president.

Summarizes — Teacher pulls together and restates some aspect of the lesson or repeats student's answer.

Examples:

1. Jim says the answer is four.
2. Yesterday we discussed Thomas Jefferson's attitude about land ownership and its relevance to present day problems.

Imperative

Teacher directs students to do only academic tasks using commands or requests.

Examples:

1. Please open your books.
2. Would you work that problem on the board?
3. Will you sit down and finish your work?

Personalizes Task

Teacher relates task to students' or her own personal experience(s).

Examples:

1. Teacher uses student homes to teach map reading or student names to teach alphabetizing.
2. Teacher discusses previous TV show with class in relation to lesson.
3. Today is John's birthday.
4. Teacher speaks Spanish to clarify something to a primarily Spanish speaking student.

Specific Questions

Teacher asks a question related to academic subject matter only for which there is one correct answer or a predetermined list of answers.

Examples:

1. How do you count to 10 in Spanish?
2. Name the months of the year.
3. Teacher poses problem -- then asks student for answer using his name: John?

Challenging

Teacher asks open-ended, non-specific questions which involve thought on the part of the student.

Examples:

1. How did we arrive at that answer?
2. What are ways that we can help save our environment?

Feedback	Teacher gives information (verbally or nonverbally) about the accuracy of a student response. Examples: 1. Head nod or shake in response. 2. Good, OK, right, no, not quite, that's wrong. 3. Good, 3 + 4 = 7.
Competency Testing	Teacher gives test in order to assess student proficiency in specific subject matter. Examples: 1. Math quiz. 2. Spelling test.
Competition	Teacher divides class by individuals or groups for motivation for completing tasks and/or purposes of evaluation. Examples: 1. Whoever is finished first will leave for recess first. 2. Spelling bee. 3. Hangman game.
Personalizes	Teacher focuses attention on an individual child, creating a momentarily dyadic relationship with one child. This can occur even across a classroom. Examples: 1. Teacher moves from student to student offering individual help. 2. Teacher uses student's name.
Smile/Laugh	Facial expression of teacher is one of pleasure and approval. Examples: 1. Teacher smiles or laughs while interacting with individual or class.

Physical Contact

Teacher is involved in affectionate physical interaction or negative physical interaction with student.

Examples:

1. Teacher puts arm around child.
2. Teacher holds child's hand as she helps the student to write letters.
3. (Constraining) Teacher turns student around in desk sternly by arm.

Listens

Teacher focuses attention on any student's verbal expression (eye contact is one measure) and indicates a real interest and concern.

Feedback (SUC)

Communicates Expectations for Level of Success: Teacher recognizes ability to succeed either of an individual or the whole class.

Examples:

1. I just know Martha can do it.
2. The whole class is going to do well on the test.

Feedback (RIA)

Recognizes Individual Accomplishments: Teacher indicates that a student or class has performed well, has made an unusual contribution, and/or has achieved more than the usual standards of excellence.

Examples:

1. Look at how well Sandra is working.
2. This is the first time you have done it!
3. John, you understand this. Would you help the others in your group?

Administration/Management

Any commands, requests, questions, or statements that relate to non-academic management or administration.

Examples:

1. Close the door.
2. The football team meets at 3.
3. Please sit down and be quiet.

APPENDIX B

(1) Student Observation Instrument

(2) Student Behavior Categories: Definitions and Examples

STANFORD R&D CENTER - PROJECT 3C
STUDENT ENGAGEMENT OBSERVATION INSTRUMENT
DATE_____

ROUND___ _____TIME_____
TEACHER_____
LESSON_____

OBSERVER__ _____

PAGE_____OF____

DESCRIPTIONS	TIME	SEX		RACE					MOT		VER		VIS		GLOBAL ASSESSMENT				DIRECTION					GROUPING			OTHER
		M	F	W	B	M	A	O	E	D	E	D	E	D	R	E	P	D	N	T	A	M	P	2	S	L	
1																											
2																											
3																											
4																											
5																											
6																											
7																											
8																											
9																											
10																											
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	SUM																										

STUDENT OBSERVATION INSTRUMENT

All indicators with the exception of "global assessment" will be marked with a ✓.

INDICATOR	DEFINITION
Description	Each line of every set will be numbered from 1 to 10.
Race - W	White
B	Black
M	Mexican
A	Asian
O	Others (American Indians, etc.)
Motor Engagement	Student movement in relation to teacher directed task. Examples: 1. Student raising hand. 2. Student writing.
Motor Disengagement	Student movement in relation to non-tasks. Examples: 1. Student throwing things, fidgeting, hitting another child. 2. Student walking around room without direction.
Verbal Engagement	Student recitation in response to appropriate task. Examples: 1. Student answering teacher's questions, stating ideas, reciting. 2. Group recitation, singing, practicing phonic sounds.

Verbal Disengagement

Student talking or singing inappropriately.

Examples:

1. Student talking to another student about a non-task related subject.
2. Student answering teacher back when not appropriate.

Visual Engagement

Student visually attending to the appropriate task.

Examples:

1. Student watching teacher while he is talking.
2. Student watching a board, film, or book if he is reading.

Visual Disengagement

Student's eyes not focused on appropriate tasks.

Examples:

1. Student looking at window, at floor, or daydreaming.
2. Student sleeping.

A 1 or 2 intensity rating will be used to mark global assessment. A 2 indicates extreme intensity.

Global Engagement

Receptive

Student looking at appropriate object but showing no motor or verbal behavior.

Examples:

1. Student listening to teacher.
2. Student watching film or reading a book.

Expressive

Student looking at appropriate object while participating in motor or verbal behavior.

Examples:

1. Student raising hand to answer a question.
2. Student involved in writing.

Global Disengagement

Passive — Student not attending but not disturbing another student or class.

Examples:

1. Student daydreaming or sleeping.
2. Student drawing pictures when he should be reading.

Disruptive — Student behaving in a manner disruptive to the learning process of one or more students.

Direction

Non-Task — Student not attending to appropriate task.

Examples:

1. Student looking at book when he should be attending to teacher or material.
2. Student involved in bothering other students.

When a student is involved in a non-task behavior, the non-task indicator and the indicator the student is supposed to be directed towards will be checked.

Teacher — Student attending to teacher.

Examples:

1. Student and teacher working together on a problem.
2. Student raising hand to attract teacher's attention.

Aide — Student interacting with teacher aide or assistant.

Examples:

1. Adult helping student.
2. Student from upper grade helping one or more students.

Material — Student engaged in an academically appropriate task which involves use of materials.

Examples:

1. Student reading a book.
2. Student working with a geoboard.

Peers	Student working together on an appropriate task without direct adult supervision. Examples: 1. Group of students working on a map study. 2. Student listening to another student recite a poem.

Grouping

2 - student interacting with one other person.

Small - eight or less students.

Large - nine or more students.

APPENDIX C

Inter-observer Agreement Tables

(1) Inter-observer Reliability of Teacher Strategies and Student Behavior Categories Mean Adjusted Agreement over Ten Minute Calibration Period for All Rounds

(2) Inter-observer Reliability of Teacher Strategies Mean Adjusted Agreement over Ten Minute Calibration Period for all Observers

(3) Inter-observer Reliability of Student Behavior Categories Mean Adjusted Agreement for All Observers over Ten Minute Calibration Period

(4) Inter-observer Reliability of Teacher Strategies Mean Adjusted Agreement over Ten Minute Calibration Period for All Observers

(5) Inter-observer Reliability of Student Behavior Categories Mean Adjusted Agreement over Ten Minute Calibration Period for All Observers

(6) Inter-observer Reliability of Global Student Behavior Categories Mean Adjusted Agreement for All Observers Over Ten Minute Calibration Period

TABLE I

Inter-Observer Reliability of Teacher Strategies
and Student Behavior Categories
Mean Adjusted Agreement over Ten Minute Calibration Period
Across All Rounds for All Observers

Teacher Strategy	Rd. I $\bar{X}$ n=6	Rd. II $\bar{X}$ n=6	Mean
Stimulus Variation and Change	.96	.99	.98
Surprises	1.00	1.00	1.00
Encourages Manipulation of Materials	.68	.99	.84
Uses Visual Aides	.75	.80	.78
Moves	.53	.63	.58
Orients	.98	.98	.98
Choice	1.00	1.00	1.00
States/Explains	.48	.76	.62
Summarizes	.75	.87	.81
Commands	.75	.78	.77
Personalizes Task	.90	.86	.88
Questions	.63	.77	.70
Challenges	.92	.89	.91
Gives Feedback	.71	.85	.78
Tests	1.00	1.00	1.00
Fosters Competition	1.00	1.00	1.00
Personalizes	.76	.86	.81
Smiles	.90	.83	.89
Touches	.98	.93	.96
Listens	.58	.66	.62
Anticipates Success	1.00	.99	1.00
Rewards Individual Achievement	.92	.95	.94
Administration/ Management	.97	.97	.97
Discipline	.98	.92	.95
Average/Round	.84	.89	.87

Student Behavior	Rd. I $\bar{X}$ n=6	Rd. II $\bar{X}$ n=6	Mean
Motor Engaged	.80	.79	.80
Motor Disengaged	.67	.74	.71
Verbal Engaged	.86	.99	.93
Verbal Disengaged	.89	.95	.92
Visual Engaged	.80	.89	.85
Visual Disengaged	.80	.90	.85
Global Receptive	.71	.73	.72
Global Expressive	.74	.78	.76
Global Passive	.84	.94	.89
Global Disruptive	.90	.96	.93
Direction Non-task	.77	.90	.84
Direction Teacher	.50	.89	.70
Direction Aide	1.00	1.00	1.00
Direction Materials	.74	.74	.74
Direction Peers	.95	.91	.93
Grouping Two	.96	.91	.94
Grouping Small	1.00	.96	.98
Grouping Large	.96	.88	.92
Average/Round	.83	.88	.86

Round I

TABLE II

Inter-Observer Reliability of Teacher Strategies

Mean Adjusted Agreement over 10 Minute Calibration Period

for All Observers N=6

Teacher Strategy	Agree. X n=6	No. of Differ.	Av. Freq. of Strat. Occur.	Freq. of Use Cals. & Obs.	Range of Strategy Occurrence for Cals. & Obs.
Stimulus Variation and Change	.96	4	C= .33 O= .67	C = 2 O = 4	C=0.0 - .03 O=0.0 - .10
Surprises	1.00	0	C= 0.0 O= 0.0	C = 0 O = 0	C=0.0 -0.0 O=0.0 -0.0
Encourages Manipulation of Materials	.68	29	C=11.67 O= 8.50	C = 70 O = 51	C=0.0 -1.00 O=0.0 -1.00
Uses Visual Aides	.75	23	C= 9.17 O=10.33	C = 55 O = 62	C=0.0 - .63 O= .03- .77
Moves	.53	42	C=23.50 O=17.33	C =141 O =104	C= .60- .93 O= .20- .83
Orients	.98	2	C= .50 O= .50	C = 3 O = 3	C=0.0 - .07 O=0.0 - .07
Choice	1.00	0	C= 0.0 O= 0.0	C = 0 O = 0	C=0.0 -0.0 O=0.0 -0.0
States/Explains	.48	47	C=11.50 O=10.33	C = 69 O = 62	C= .30- .50 O= .07- .63
Summarizes	.75	23	C= 4.33 O= 4.17	C = 26 O = 25	C=0.0 - .43 O=0.0 - .27
Commands	.75	23	C= 8.17 O= 7.17	C = 49 O = 43	C= .07- .60 O= .03- .57
Personalizes Task	.90	9	C= 1.00 O= .50	C = 6 O = 3	C=0.0 - .20 O=0.0 - .10
Questions	.63	33	C=11.67 O= 9.17	C = 70 O = 55	C= .23- .87 O= .13- .67
Challenges	.92	7	C= 1.00 O= .83	C = 6 O = 5	C=0.0 - .07 O=0.0 - .13
Gives Feedback	.71	26	C= 5.17 O= 3.83	C = 31 O = 23	C= .07- .27 O=0.0 - .23
Tests	1.00	0	C= 0.0 O= 0.0	C = 0 O = 0	C=0.0 -0.0 O=0.0 -0.0
Fosters Competition	1.00	0	C= 4.83 O= 4.83	C = 29 O = 29	C=0.0 - .97 O=0.0 - .97
Personalizes	.76	22	C=20.00 O=18.33	C =120 O =110	C= .20-1.00 O= .17- .90
Smiles	.90	9	C= 1.50 O= 1.67	C = 9 O = 10	C=0.0 - .13 O=0.0 - .10
Touches	.98	2	C= 0.0 O= .33	C = 0 O = 2	C=0.0 -0.0 O=0.0 - .07
Listens	.58	38	C=17.83 O=13.83	C =107 O = 83	C= .40-1.00 O= .27- .83
Anticipates Success	1.00	0	C= .17 O= .17	C = 1 O = 1	C=0.0 - .03 O=0.0 - .03
Rewards Individual Achievement	.92	7	C= 1.50 O= 1.00	C = 9 O = 6	C=0.0 - .10 O=0.0 - .07
Administration/ Management	.97	3	C= 1.33 O= .83	C = 8 O = 5	C=0.0 - .17 O=0.0 - .17
Discipline	.98	2	C= .17 O= .50	C = 1 O = 3	C=0.0 - .03 O=0.0 - .10
Average/Round	.84	3			
Totals		351		C =812 O =689	

TABLE III
Round I
Inter-Observer Reliability of Student Behavior Categories
Mean Adjusted Agreement over Ten Minute Calibration Period
for All Observers
N=6

Student Behavior	Agree. $\bar{X}$ n=6	No. of Differ.	Av. Freq. of Strat. Occur.	Freq. of Use Cals. & Obs.	Range of Strategy Occurience for Cals. & Obs.
Motor Engaged	.80	16	C= 12.5 O= 11.83	C = 75 O = 71	C= .13 - .73 O= .07 - .70
Motor Disengaged	.67	26	C= 6.67 O= 9.17	C = 40 O = 55	C= .07 - .50 O= .13 - .57
Verbal Engaged	.86	11	C= 2.83 O= 3.00	C = 17 O = 18	C=0.0 - .17 O= .03 - .13
Verbal Disengaged	.89	9	C= .83 O= 1.33	C = 5 O = 8	C=0.0 - .10 O=0.0 - .10
Visual Engaged	.80	16	C= 24.17 O= 22.50	C = 145 O = 135	C= .73 - .90 O= .70 - .83
Visual Disengaged	.80	16	C= 2.33 O= 4.00	C = 14 O = 24	C=0.0 - .13 O= .07 - .20
Global Receptive	.71	23	C= 11.33 O= 10.17	C = 68 O = 61	C= .10 - .70 O= .07 - .60
Global Expressive	.74	21	C= 12.83 O= 12.00	C = 77 O = 72	C= .10 - .73 O= .10 - .70
Global Passive	.84	13	C= 1.50 O= 3.00	C = 9 O = 18	C=0.0 - .10 O= .03 - .17
Global Disruptive	.90	8	C= .83 O= 1.50	C = 5 O = 9	C=0.0 - .07 O= .03 - .13
Direction Non-task	.77	18	C= 2.33 O= 4.33	C = 14 O = 26	C=0.0 - .13 O= .07 - .20
Direction Teacher	.50	40	C= 16.33 O= 20.67	C = 98 O = 124	C= .27 - .80 O= .53 - .80
Direction Aide	1.00	0	C= 0.0 O= 0.0	C = 0 O = 0	C=0.0 -0.0 O=0.0 -0.0
Direction Materials	.74	21	C= 13.00 O= 13.17	C = 78 O = 79	C= .10 - .77 O= .17 - .77
Direction Peers	.95	4	C= .17 O= .83	C = 1 O = 5	C= 0.0 - .03 O= 0.0 - .07
Grouping Two	.96	3	C= 2.00 O= 1.50	C = 12 O = 9	C= 0.0 - .30 O= 0.0 - .27
Grouping Small	1.00	0	C= 0.0 O= 0.0	C = 0 O = 0	C= 0.0 -0.0 O= 0.0 -0.0
Grouping Large	.96	3	C= 24.50 O= 25.00	C = 147 O = 150	C= .60 - .90 O= .63 - .90
Average/Round	.83				
Totals		248		C = 805 O = 864	

TABLE IV
Round II

Inter-Observer Reliability of Teacher Strategies
Mean Adjusted Agreement over 10 Minute Calibration Period
for All Observers

Teacher Strategy	Agree. X n=6	No. of Differ.	Av. Freq. of Strat. Occur.	Freq. of Use Cals. & Obs.	Range of Strategy Occurrence for Cals. & Obs.
Stimulus Variation and Change	.99	1	C= .67 O= .83	C= 4 O= 5	C= 0.0 - .07 O= 0.0 - .07
Surprises	1.00	0	C= 0.0 O= 0.0	C= 0 O= 0	C= 0.0 -0.0 O= 0.0 -0.0
Encourages Manipulation of Materials	.99	1	C= 9.67 O= 8.17	C= 58 O= 49	C= 0.0 -1.00 O= 0.0 -1.00
Uses Visual Aides	.80	18	C=12.17 O=10.33	C= 73 O= 62	C= .03- .67 O= 0.0 - .60
Moves	.63	33	C=14.83 O=12.00	C= 89 O= 72	C= 0.0 - .73 O= 0.0 - .70
Orients	.98	2	C= 1.00 O= 1.00	C= 6 O= 6	C= 0.0 - .07 O= 0.0 - .07
Choice	1.00	0	C= 0.0 O= 0.0	C= 0 O= 0	C= 0.0 -0.0 O= 0.0 -0.0
States/Explains	.76	22	C=11.33 O=10.33	C= 68 O= 62	C= .10- .80 O= .03- .80
Summarizes	.87	12	C= 6.17 O= 5.83	C= 37 O= 35	C= .07- .40 O= .03- .37
Commands	.78	20	C= 6.67 O= 4.67	C= 40 O= 23	C= .07- .43 O= 0.0 - .30
Personalizes Task	.86	13	C=17.67 O=15.83	C=106 O= 95	C= .13- .90 O= .13- .80
Questions	.77	21	C=13.17 O=13.33	C= 79 O= 80	C= .20- .77 O= .30- .73
Challenges	.89	10	C= 2.33 O= 2.33	C= 14 O= 14	C= 0.0 - .23 O= 0.0 - .27
Gives Feedback	.85	14	C= 4.17 O= 3.00	C= 25 O= 18	C= .03- .20 O= .03- .20
Tests	1.00	0	C= 0.0 O= 0.0	C= 0 O= 0	C= 0.0 -0.0 O= 0.0 -0.0
Fosters Competition	1.00	0	C= 0.0 O= 0.0	C= 0 O= 0	C= 0.0 -0.0 O= 0.0 -0.0
Personalizes	.86	13	C=23.17 O=22.33	C=139 O=134	C= .57-.93 O= .47-.97
Smiles	.88	11	C= 3.50 O= 3.00	C= 21 O= 18	C= 0.0 -.30 O= 0.0 -.20
Touches	.93	6	C= 1.67 O= 2.33	C= 10 O= 14	C= 0.0 -.30 O= 0.0 -.43
Listens	.66	31	C=16.83 O=17.00	C=101 O=102	C= .33-.90 O= .20-.93
Anticipates Success	.99	1	C= 0.0 O= 0.0	C= 0 O= 0	C= 0.0 -0.0 O= 0.0 -0.0
Rewards Individual Achievement	.95	5	C= 2.00 O= 1.50	C= 12 O= 9	C= .03- .17 O= .03- .13
Administration/ Management	.97	3	C= .83 O= .67	C= 5 O= 4	C= 0.0 - .13 O= 0.0 - .07
Disciplines	.92	7	C= 1.50 O= .67	C= 9 O= 4	C= 0.0 - .13 O= 0.0 - .07
Average/Round	.89				
Totals		244		C=896 O=811	

TABLE V
Round II
Inter-Observer Reliability of Student Behavior Categories
Mean Adjusted Agreement over Ten Minute Calibration Period
for All Observers

Student Behavior	Agree. $\bar{X}$ n=	No. of Differ.	Av. Freq. of Behav. Occur.	Freq. of Use Cals. & Obs.	Range of Behavior Occurrence for Cals. & Obs.
Motor Engaged	.79	17	C=11.83 O=10.83	C= 71 O= 65	C= .30- .47 O= .23- .43
Motor Disengaged	.74	21	C=16.83 O=17.00	C=101 O=102	C= .43- .77 O= .30- .87
Verbal Engaged	.99	1	C= 3.17 O= 3.33	C= 19 O= 20	C=0.0 - .23 O=0.0 - .23
Verbal Disengaged	.95	4	C= 1.17 O= 1.17	C= 7 O= 7	C=0.0 - .10 O=0.0 - .07
Visual Engaged	.89	9	C=24.83 O=24.67	C=149 O=148	C= .73- .93 O= .67- .93
Visual Disengaged	.90	8	C= 2.33 O= 2.17	C= 14 O= 13	C=0.0 - .17 O=0.0 - .20
Global Receptive	.73	22	C=11.67 O=13.17	C= 70 O= 79	C= .20- .50 O= .37- .50
Global Expressive	.78	18	C=13.17 O=11.67	C= 79 O= 70	C= .33- .60 O= .27- .47
Global Passive	.54	5	C= .67 O= 1.17	C= 4 O= 7	C=0.0 - .07 O=0.0 - .13
Global Disruptive	.96	3	C= 1.50 O= 1.00	C= 9 O= 6	C=0.0 - .13 O=0.0 - .07
Direction Non-task	.90	8	C= 2.17 O= 2.17	C= 13 O= 13	C=0.0 - .17 O=0.0 - .20
Direction Teacher	.89	9	C=22.33 O=22.50	C=134 O=135	C= .43- .90 O= .47- .90
Direction Aide	1.00	0	C= 0.0 O= 0.0	C= 0 O= 0	C=0.0 -0.0 O=0.0 -0.0
Direction Materials	.74	21	C=11.17 O= 7.83	C= 67 O= 47	C=0.0 - .80 O=0.0 - .67
Direction Peers	.91	7	C= 1.00 O= 1.83	C= 6 O= 11	C=0.0 - .13 O=0.0 - .17
Grouping Two	.91	7	C= 1.33 O= .83	C= 8 O= 5	C=0.0 - .10 O=0.0 - .17
Grouping Small	.96	3	C= .50 O= 0.0	C= 3 O= 0	C=0.0 - .07 O=0.0 -0.0
Grouping Large	.88	10	C=25.17 O=26.17	C=151 O=157	C= .80- .87 O= .80-1.00
Average/Round	.88				
Totals		173		C=903 O=885	

TABLE VI

Inter-Observer Reliability of Global Student Behavior Categories

Mean Adjusted Agreement

for All Observers over Ten Minute Calibration Period

Global Behavior	Round I	Round II	Mean
Receptive	.71	.73	.72
Expressive	.74	.78	.76
Passive	.84	.94	.89
Disruptive	.90	.96	.93
Average/Round	.80	.85	.83